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Chronic CAD/Stable Ischemic Heart Disease

NMR-BASED LIPOPROTEIN PARTICLE PROFILING IDENTIFIES NOVEL SIGNATURES FOR CARDIOVASCULAR DISEASE

Poster Contributions
Poster Sessions, Expo North
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Session Title: Chronic CAD: Genetics and Biomarkers
Abstract Category: 9. Chronic CAD/Stable Ischemic Heart Disease: Basic
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Background: The standard lipid panel routinely performed for cardiovascular risk assessment measures the cholesterol and triglyceride content of lipoproteins. Lipoprotein particle concentrations measured by NMR spectroscopy more strongly associate with coronary artery disease (CAD) risk. We hypothesized that lipoprotein particle measures would be associated with cross sectional CAD and CAD severity, and would predict incident cardiovascular events.

Methods: NMR analysis of lipoprotein particle concentration and size were performed in frozen plasma obtained from 1,736 individuals enrolled in the CATHGEN biorepository of patients undergoing cardiac catheterization at Duke University Medical Center. Principal components analysis (PCA) was performed to reduce the larger number of correlated lipoprotein variables into a smaller number of uncorrelated factors. A weighted score made up of 6 lipoprotein subclass/size parameters related to insulin resistance (LP-IR) was analyzed separately. Linear regression was used to assess the association between PCA-derived lipoprotein factors with CAD (≥1 epicardial vessel with ≥75% stenosis), extent of CAD (number of diseased vessels and CAD-index), and cardiovascular events (incident death or myocardial infarction).

Results: Six PCA-derived lipoprotein factors were identified. Two factors were associated with CAD after adjustment for multiple comparisons: a factor composed of high density lipoprotein (HDL) particle size (adjusted $p<0.0001$), and one composed of low density lipoprotein (LDL) particle size ($p=0.0005$). The same factor composed of HDL particle size was associated with extent of CAD (adjusted $p<0.0001$). Three factors were associated with incident events: the same HDL particle size factor (adjusted $p<0.0001$); one composed of several measures of HDL and LDL particle size (adjusted $p<0.0001$); and LP-IR (adjusted $p<0.0001$).

Conclusions: Using NMR-based lipoprotein particle size profiling, we have identified novel lipoprotein signatures that independently discriminate the presence and extent of CAD and predict incident mortality and MI. These may serve as novel biomarkers for CAD discrimination and event prediction.